

REMARKS

Applicants appreciate the thorough examination of the present application that is evidenced in the final Official Action of December 20, 2006 (the "Official Action"). Applicant further sincerely appreciates the Examiner's consideration in conducting a telephonic interview for the present application with the undersigned attorney on January 8, 2007. For the reasons discussed below, Applicants respectfully request reconsideration of the present application and submit that the claims are allowable over the art of record.

Claims 21-29 are pending in the present application. Claims 21-23 and 26-28 stand rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent Publication No. 2006/0125057 to DiCioccio et al ("DiCioccio"). Claims 24 and 25 stand rejected under 35 U.S.C. § 103(a) as unpatentable over DiCioccio in view of admitted prior art. Claim 29 is indicated as allowable if rewritten in independent form.

In the telephonic interview of January 8, 2007, the Examiner and the undersigned attorney discussed DiCioccio. No amendments to the claims were proposed or discussed. The Examiner requested the undersigned attorney to provide a response explaining the Applicants' assertions with respect to DiCioccio in writing.

The Official Action states that the method of DiCioccio "appears to be the same as that of the invention method for forming the substrate as described in ... the specification." Official Action, p. 2. Therefore, the Official Action concludes, the substrate formed by DiCioccio would include a carrot defect "having a nucleation point in the vicinity of an interface between the substrate and the epitaxial layer, wherein the carrot defect terminates within the epitaxial layer." Id.

The Official Action further states, in response to Applicant's arguments, that DiCioccio describes growing several epitaxial layers, and that the carrot defects would have to be terminated within each epitaxial layer, since the deposition process is stopped before another epitaxial layer is formed. Official Action, p. 4 (emphasis added).

Applicant respectfully submits that carrot defects do not terminate simply because epitaxial growth is stopped and restarted. This is due to the nature of "epitaxy," or "epitaxial growth," in which atoms of a thin film of single-crystal material grow on a template provided by an underlying layer of material. In epitaxy, both the crystalline template of the underlying

layer, as well as the defects in the underlying layer, tend to propagate into the growing layer. Nonetheless, the applicants have discovered that it is surprisingly possible to terminate a carrot-type defect in silicon carbide by growing an epitaxial layer of silicon carbide, etching the epitaxial layer, and growing a second epitaxial layer of silicon carbide on the etched first epitaxial layer in the manner described in the specification.

DiCioccio describes growing epitaxial layers of silicon carbide on a layer 3 of silicon carbide. The layer 3 is part of a SICOI (silicon carbide-on-insulator) substrate that includes a support 1 successively bearing a silicon oxide layer 2 and the silicon carbide layer 3. DiCioccio, para. [0036]. DiCioccio explains that the layer 3 is a transferred layer that can be obtained by means of the SmartCut technique. That is, the layer 3 has been removed by a SIMOX process and bonded on the support member 1 through the layer of silicon oxide 2 as described in U.S. Patent No. 6,391,799. See DiCioccio, para. [0006]. U.S. Patent No. 6,391,799 explains that the transferred layer may be formed by "surface carburizing the silicon of substrate 10 by reaction between a hydrocarbon and the silicon." See U.S. Patent No. 6,391,799 col. 4, l. 66 - col. 5, l. 1. Thus, the layer 3 is not an epitaxial layer.

Moreover, the layer 3 of silicon carbide is described by DiCioccio not as an epitaxial layer, but as a "thin layer" or a "transferred layer." See DiCioccio, para. [0036]. DiCioccio further distinguishes layer 3 from the subsequent epitaxial layers by stating that "SiC epitaxy was conducted on thin 6H and 4H polytype layers 3 ..." DiCioccio, para. [0037].

Thus, the layer 3 of silicon carbide is not an epitaxial layer as recited in Claim 21, and, further, is not an epitaxial layer on a bulk layer of silicon carbide as recited in Claim 22.

DiCioccio describes the growth of various polytypes of SiC on the thin SiC layer 3. While DiCioccio discloses polishing or etching the layer 3 prior to epitaxial growth thereon in order to improve the surface of the thin layer (DiCioccio, par. [0039]), such steps are not performed on an epitaxial layer. Thus, DiCioccio does not disclose growing an epitaxial layer, etching the epitaxial layer, and growing a second epitaxial layer on the etched first epitaxial layer. Therefore, it does not follow that the structure of DiCioccio must include a terminated carrot defect within an epitaxial layer as recited in Claim 21 and/or Claim 22.

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CONCLUSION

The above constitutes a complete summary of the telephonic interview between the Examiner and the undersigned attorney pursuant to MPEP 713.04. In light of the above remarks, Applicants respectfully submit that the above-entitled application is in condition for allowance. Favorable reconsideration of this application is respectfully requested. If, in the opinion of the Examiner, a further telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (919) 854-1400.

Respectfully submitted,



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